Race and Ethnic Inequality in Health and Health Care in Colombia

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FEDESARROLLO

WORKING PAPERS SERIES • DOCUMENTOS DE TRABAJO

Enero de 2005 • No. 29

Race and Ethnic Inequality in Health and Health Care in Colombia[1]

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First Version: October 30th 2004
This Version: January 3rd 2005

Abstract

In this paper we explore race and ethnic health inequalities in Colombia. We first characterize the situation of Afro-Colombians and indigenous populations in Colombia. Second, we document racial/ethnic disparities in health outcomes and access to health care using data from the Living Standards Survey and the evaluation of the *Familias en Acción* program. Third, we set up a statistical model that allows us to test whether some of the health inequalities that are observed still remain after controlling for a wide range of individual and household observed characteristics, including access to health care. The results indicate that most racial and ethnic disparities in health and access to health care disappear once we control for socioeconomic characteristics of individuals, employment status and characteristics of the job and geographic location among other things. Based on these findings we make some specific policy recommendations aimed at improving the status of racial minorities in Colombia.

Key Words: Health Outcomes, Health Care, Race and Ethnicity.

[1] Lucas Higuera provided excellent research assistance. We gratefully acknowledge financial support from the Inter-American Development Bank (Social Programs Division – Regional Operations Department 3) as well as useful comments from Antonio Giuffrida. Correspondence to rbernal@northwestern.edu or mcardenas@fedesarrollo.org.co.

1. Introduction

Health inequalities have recently started to receive a good deal of attention in developing countries. However scarce, some preliminary literature has begun to explore the extent of health inequalities in developing countries, in particular, across the socioeconomic dimension. In other words, trying to understand how large the differences in health outcomes are across socioeconomic groups. Conclusions of these studies coincide with what has already been found for industrialized countries: health outcomes are significantly better for individuals that are better-off in terms of income and socioeconomic conditions.

In a recent paper, Wagstaff (2002) presents measures of health inequality, much in the spirit of concentration indices commonly used to measure income inequality. In a nutshell, the measure is calculated by plotting the cumulative proportion of individuals experiencing a given health outcome (e.g., deaths in the case of mortality measures) against the cumulative proportion of population at risk, ranked by economic status. The concentration index is then calculated as twice the area between the resulting curve and the diagonal. By convention, if the concentration index is negative, it implies that the constructed curve lies above the diagonal, i.e. that the penetration of that outcome (mortality in our example) is higher among poorer individuals and inequalities in mortality are therefore to the advantage of better-off children.

Strikingly, during the nineties Latin America and the Caribbean exhibited the largest inequalities on all measures of health which include: infant mortality rate (IMR), under-five years of age mortality rate (U5MR), percent of children stunted (percent of children whose height measurement is more than two standards deviation below the median reference standard for their age as established by the World Health Organization), percent of children underweight, diarrhea prevalence (percent of surviving children under three, four, or five years old who had diarrhea in the two weeks preceding the survey) and acute respiratory infection prevalence (ARI). While Colombia exhibits worse health inequalities than the world average, these are slightly above the Latin American average.

The growing interest in health inequalities in developing countries reflects the extent of the broad interpretation being given to the term “poverty” in the academic literature, and the increasing tendency of defining goals of multilateral institutions and aid organizations in terms of poverty reduction. At the same time, there is a growing consensus that health inequalities (defined between the poor and the rich, and or in other dimensions that characterize different populations, like minorities) are unjust. In other words, reducing the cross-country and intra-country gaps between different population groups does not simply imply reducing poverty, but also improving social justice and equity (see Alleyne, Casas, and Castillo-Salgado, 2000).

As the debate on socioeconomic and health inequalities in developing countries continues, particularly related to the question of furthering the development assistance from aid agencies and industrialized countries in developing countries, much remains to be understood about the nature of these inequalities, their magnitude, characteristics and cross-countries differences.

The main objective of this paper is to explore race and ethnic health inequalities in Colombia. Not only literature about race inequality in health in Colombia is non-existing but also the literature on the more general topic of social and economic exclusion of minorities defined by race and ethnicity

in Colombia is rather limited. A remarkable exception is a study by Florez, Medina and Urrea (2003) who review the literature about social exclusion by race in Latin America and the Caribbean. In spite of the fact that data about race and ethnicity is rather scarce in Latin America and the Caribbean, the authors show some evidence that minorities (blacks and indigenous populations) in Latin America have lower levels of income and human capital. A few studies (see Psacharopoulos and Patrinos, 1994, Patrinos, Velez and Psacharopoulos, 1993) indicate that after controlling for a set of observable characteristics, a significant part of the difference in income and human capital between blacks/indigenous populations and whites is still explained by race itself.

In this paper, we first characterize the situation of afro-colombians and indigenous populations in Colombia in terms of access to health care and health outcomes. Second, we set up a statistical model that allows us to test whether some of the health inequalities that are observed still remain after controlling for a wide range of individual and household observed characteristics, including access to health care. Third, we explore possible reasons for ethnic health disparities when present. Finally, based on these results we provide some specific policy recommendations to address health inequalities in Colombia.

According to recent data from the LSS (2003) the afro-colombian population (blacks, "mulatos", palenqueros or raizal del archipiélago) represents approximately 7.2% of the country's total population while approximately 2% is indigenous. Some authors report that most part of the black population in Latin America and the Caribbean seems to be located in Brazil, Colombia, Haiti, Cuba and Dominican Republic[2]. Hence, it seems to be important to understand the status of these minorities in terms of health and access to health in Colombia.

2. Conceptual Considerations about Race and Ethnicity

Numerous studies have documented significant racial and ethnic disparities in health (incidence, mortality and severity of diseases), particularly in the United States but also around the world[3]. The way in which these differences are interpreted is very important in terms of public health policy design. These disparities are generally explained by two factors: genetic susceptibility to disease or differences in cultural practices. However, these explanations are unsatisfactory in the light of scientific evidence and are mostly uninformative in terms of public policy since in both cases, it is minorities (their inheritance or their culture and behaviors) that are seen as problematic.

The difficulty in interpreting racial and ethnic disparities in health is partly related to the fact that there is no agreement about the definition of race and ethnicity as well as the fact that the way in which racial status is assigned varies across societies and has changed over time. The term race has been commonly defined in terms of biological differences between groups that are assumed to be genetic. For example, some authors argue that five major racial groups can be identified in the U.S.: Africans, Caucasians, Pacific Islanders, Asians, and Native Americans[4]. However, human races are not and never were pure. Additionally, research within the biological sciences has also provided strong evidence that these broad groupings of the population explain little in terms of the overall

[2] Florez, Medina and Urrea (2003).
[3] For a review of these disparities in health in the U.S. see Office of Research on Minority Health (ORMH) history. 2000. http://www.od/nih/gov/ormh/history.html. For a review of several studies on different countries see LaVeist (2002).
[4] See Risch et al. (2002).

genetic variation of human beings. In other words, that human genetic diversity cannot be partioned into genetically determined racial categories.

For example, Lewontin (1972) showed that over 85% of the observed genetic variation (using internal proteins as markers of genetic variability) occurred within racial groups, only 6.3 percent of variability occurred between racial groups, and approximately 8.3 percent of variability between ethnic groups within a race. More recent work by Barbujani et al. (1997) shows that 84 percent of genetic diversity occurred within populations using 109 polymorphic DNA sequences. This evidence does not suggest that there are no genetic differences between races, but rather that very few differences have been found which directly relate to health[5]. Even if some diseases have been found to be purely hereditary, the constant interaction between genes and the environment means that it is difficult to disentangle genetic from environmental factors. In fact, genetic predisposition is not a useful explanation for racial and ethnic disparities in health. If racial and ethnic groups do not represent distinct gene pools, then genetic explanations for health inequities are weakly (if at all) informative.

The way in which racial/ethnicity status is assigned in the U.S. and most countries ultimately relates to social and political concepts more than genetics or scientific rigor. In short, the definition of ethnicity builds on a complex construct that includes biology, history, cultural practices, language, religion and lifestyle, all of which affect health outcomes. The lack of major systematic genetic differences between ethnic groups, together with significant differences in lifestyle (nutrition, alcohol, smoking, etc), means that ethnic differences in morbidity and mortality to some extent provide evidence against the importance of genetic factors and for the importance of environmental factors.

This means that racial and ethnic categories cannot be fully understood outside of the ways in which the process of this categorization is materialized in the everyday life of people. Rather than genetic groupings, these categories embody inequities in access to wealth and political power, experiences of racism, systems of privilege, etc. So when we study racial and ethnic disparities in health we would want to examine the potential biological mechanisms through which life experiences can affect health.[6] This has the additional advantage of providing the researcher with a variety of policies aimed at social factors that mediate between race and health.

This discussion is important in terms of the empirical strategy used to understand and study racial and ethnic disparities in health. This type of studies usually includes a race dummy variable in a regression model to explain a health outcome. Once the researcher has controlled for individual characteristics and socioeconomic conditions, the race dummy variable can be thought of as being correlated with unspecified biological and cultural factors. This approach allows the researcher to report on differences in the intercept but is less useful from the point of view of policy design aimed at reducing health disparities since everything is left to heritage or individual behavior. This approach does not provide any information about the potential differences in the effects of the independent variables on the dependent variable, which might allow to specifically design policy aimed at societal factors and behaviors.

[5] See Cooper, R.S. (2003).

[6] For example, Krieger and Sidney (1996) provide evidence that both the experience and the response to racial discrimination were linked to physiological effects that contributed to the high rate of hyptertension in African Americans.

In order to explore the effects of race and shed some light about the mechanisms that mediate between race and health (outcomes and access) it can be useful to specify models separately for the groups being compared and conduct tests for whether the coefficients are significantly different[7]. Or what is equivalent, to run fully interacted models in which the race dummy variable is interacted with each of the explanatory variables. This would allow us to determine whether racial differences exist in the effect of a given variable on the health outcome. For example, in explaining a given health outcome one could include in the model individual characteristics and whether the individual has access to health care. If the coefficient on health care is statistically different between groups (black/white) then the effect of having access to health care on the health outcome is different from one group to the other. This, one could argue, is evidence of race discrimination in health care services and public policy could be design to reduce this type of effects.

In sum, it is important to understand that race is not necessarily a biological concept but rather a complex definition which involves social and cultural factors. Interpreting the race variable as purely genetic leaves little room for interventions at the disposal of governments or institutions that can be effective in reducing race-associated health differentials. A purely behavioral interpretation suggests that all interventions should focus on modifying the individuals' behavior. Finally, a more comprehensive conceptualization that includes social and individual behavioral factors suggests that changes can be made at the social (for example, health services, sanitation, nature of employment, etc.) and at the individual level.

3. Why Do Race Health Disparities Exist?

The substantial differences among the health profiles of U.S. race and ethnic groups have been well documented[8]. For example, Figure 1 shows mortality rates for U.S. racial and ethnic groups for the year 2000. African Americans have the worst health profile, and Asian Americans have the fewest health problems.

Similarly, Figure 2 shows that, whereas infant mortality rates for both, black and white Americans have declined since at least 1940; little progress has been achieved in reducing the black-white gap. It is well documented that African American infants are more likely than white infants to born preterm or low birthweight, and on average face twice the risk of death.[9]

Extensive research in this area has documented several possible explanations to explain why racial and ethnic variations in health status exist. We outline some of the most popular hypotheses below.

1) The Alrine Geronimus's weathering hypothesis. Several studies have documented the fact that minorities' adverse health characteristics may be related to hardships associated with social and economic inequality. However, recent research has not increased our understanding about the direct mechanisms that link socioeconomic status to poor health. (Geronimus, A. "Black-White Differences in the Relationship of Maternal Age to Birthweight, A Population-Based Test of the Weathering Hypothesis" in La Veist, ed.).

[7] See LaVeist (2002).
[8] See for example, National Center for Health Statistics (2001). *Health, United States, 2001, with Urban and Rural Health Chartbook*. Hyattsville, MD: National Center for Health Statistics.
[9] U.S. Department of Health and Human Services, 1985, *Report of the Secreatry's Task Force on Black and Minority Health: Vol1. Executive Summary.* Washington, DC, U.S. Government Printing Office.

2) Differences in health care access, utilization, and quality. Racial and ethnic minorities often do not have access to heath services at the same rate as do whites. Ethnic minorities have been linked to a lower likelihood of having a regular source of care, fewer physician visits, and lower total health care expenditures. These disparities are not completely explained by insurance, income or other measures of socio-economic status, severity of disease at diagnosis, availability of services, or patient preferences. While the reasons for these disparities remain poorly understood, some research suggests that the cost of care is an important consideration in clinical decisions for ethnic minority groups. (Mayberry, R., F. Mili and E. Ofili, "Racial and Ethnic Differences in Access to Medical Care" in La Veist, ed.)

3) Interrelationships between immigration, assimilation, and acculturation. Some quality of life and health advantages may accrue for groups that have had a longer period in which to develop positive social, economic, and political adaptations to a host society. Health disparities might also be explained by cultural preferences for traditional practices and partially in terms of large numbers of immigrants lacking health insurance. The importance of factors such as immigration history and diversity of cultural norms and values might partly explain health disparities by ethnic groups. (Frisbie, W.P., Ch. Youngtae and R. Hummer, "Immigration and the Health of Asian and Pacific Islander Adults in the U.S." in La Veist, ed.)

4) Exposure to racism. Racism could have an impact on health outcomes. Racism refers to differential access to goods, services and opportunities of society by race. It manifests in material conditions and in access to power. Examples of racism in material conditions include differential access to quality of education, housing, gainful employment, appropriate medical facilities, a clean environment, etc. With regard to access to power, examples include differential access to information, resources, and voice[10] (See Jones, C. "Levels of Racism, A Theoretic Framework and a Gardener's Tale" in La Veist, ed.).

5) Differential exposure to health risks. Several studies have documented the relationship between increased risks of adult mortality, long-term illness, lower ratings for self-rated health, cardiovascular disease, and smoking associated with poorer socioeconomic conditions of neighborhoods (see Pearl, M., P. Braveman and B. Abrams, 2002, "The Relationship of Neighborhood Socioeconomic Characteristics to Birthweight Among Five Ethnic Groups in California" in La Veist, ed.). These studies highlight the importance of the social environment, in addition to individual socioeconomic standing, in shaping individual behaviors and health outcomes. Individuals' health and behaviors are affected by their social and physical surroundings. For example, physical proximity to a doctor or medical facility might affect utilization of health care resources. Similarly in areas in which the number of places selling wine, wine consumption by residents increases (see Morland, K., S. Wing, A. Roux and C. Poole, 2002, "Neighborhood Characteristics Associated with the Location of Food Stores and Food Services Places" in La Veist, ed.). Typically, limited availability of products that sustain good health is accompanied by overavailability of products injurious to health (LaVeist, T. and J. Wallace, 2002, "Health Risk and Inequitable Distribution of Liquor Stores in African American Neighborhoods", in La Veist, ed.).

[10] For example, voting fights, representation in the government, etc.

6) The role of health care providers in producing health disparities. The basic idea is that doctors, unencumbered by prejudice or stereotypic beliefs, and in the presence of uncertainty about patients' underlying condition, may use race in making a diagnosis of a patient. For example, it has been documented that African American patients are less likely than white patients to receive pain medication when going to the emergency room (see Todd, K., C. Deaton, A. D'Adamo and L. Goe, 2002, "Ethnicity and Analgesic Practice" in La Veist, ed.). Similarly, Schulman et al. (Schulman, K. et al., 2002, "The Effect of Race and Sex on Physicians' Recommendations for Cardiac Catheterization" in La Veist, ed.) provide evidence that African American women were less likely than white men to be referred for heart surgery. However, other studies have suggested that this might be caused by patient preferences rather that health providers' discrimination, that is, African American patients prefer not to have a certain procedure or be prescribed a certain medicine (see for example, Whittle, J., J. Conigliaro, C.B. Good and M. Joswiak, 2002, "Do Patient Preferences Contribute to Racial differences in Cardiovascular Procedure Use?" In La Veist, ed.).

4. Description of Racial and Ethnic Minorities in Colombia

The main source of data for this section (and this paper) is the Living Standard Survey (LSS) carried out by the National Department of Statistics (DANE) during 2003 at the national level. The objective of the LSS is to provide measures of socioeconomic status of the Colombian population and understand the incidence of poverty and the relevance of various determinants of poverty. This survey was applied to a basic sample of 22,949 households which are expanded to the 11,194,108 households that constitute the total Colombian population. This survey has national coverage by region: Atlantic (Atlántico, Bolívar, Cundinamarca, Meta, Norte de Santander, Santader), Eastern (Boyaca, Cundinamarca, Meta, Norte de Santander y Santander), Central (Caldas, Caquetá, Huila, Quindío, Risaralda, Tolima), Pacific (Cauca, Chocó and Nariño), Orinoquia-Amazonia (Arauca, Casanare, Guaviare, Putumayo), Antioquia, Valle del Cauca, San Andrés y Providencia and Bogotá by municipality.

4.1. Basic Descriptive Statistics

According to the LSS, around 6.6% of the population[11] is afro-colombian (afrodescendent, "mulato" or palenquero), 2% is indigenous and less than 1% reports being either "raizal del archipiélago" [12] or gipsy in 2003. That means that approximately 9.2% of the Colombian population belongs to a racial or ethnic minority. Figure 3 shows the composition of the population by region. Minorities are mainly concentrated in the Pacific (54.71% of the population in that region is either afro-colombian, indigenous or raizal del archipelago), San Andrés y Providencia (46.79%), Valle del Cauca (20.3%) and the Atlantic region (13.1%)[13]. In the appendix we include two maps of Colombia which describe the ethnic composition by region. The first one corresponds to the distribution of afro-colombians while the second pertains the distribution of indigenous population across the different regions.

Figure 4 shows the specific composition of racial and ethnic minorities by region in Colombia in 2003 according to the LSS. Around 75% of minorities in the Pacific region are afro-colombian while 25% are indigenous. In Valle del Cauca, approximately 97% of minorities are afro-colombian and only 3% are indigenous groups. In the Atlantic region, around 69% of minorities correspond to afro-

[11] The total Colombian population was estimated to be 43.7 millions (LSS).
[12] Mulatos or palenqueros who live in San Andrés y Providencia.
[13] A significant 7.6% of the population is a racial or ethnic minority in the Amazon region.

colombians while 31% are indigenous and 90% of minorities in San Andrés y Providencia are "raizal del archipiélago" [14] and 8.7% are afro-colombians. Finally, 72% of ethnic minorities in the Amazon are indigenous while the remaining 27% are afro-colombians.

Table 2 provides some descriptive statistics about the socioeconomic status of minorities[15] using data from the LSS. In 2003 the percentage of minorities that belonged to Sisben levels[16] 1 and 2 was approximately 49.4% compared to 25.6% in the case of the rest of the population. The percentage of minorities in the lowest income quintiles (1 and 2) was approximately 49% while this fraction was equal to 45% in the case of their non-minority counterparts. Similarly, while almost 80% of the non-black, non-indigenous population did not report unsatisfied basic needs (UBN), only 53% of minorities did not.

The average household size of minorities was 4.38 compared to 3.85 for the rest of the population. In particular, afro-colombian or indigenous households had 1.39 children while the average for the rest of the population was 1.04 children per household. According to the LSS the average schooling level of the head of minority households was 5.88 vs. 7.39 in non-black, non-indigenous households. Similarly, the average schooling level of household members older than 17 years old was 6.47 in the case of minorities and 7.39 for the rest. The percentage of the population 5 to 18 years old that attended school was equal to 84.1% for the non-minority population while this fraction was equal to 77% in the case of minorities.

These results confirm the existence of socioeconomic disadvantages of minorities in Colombia with respect to the rest of the population. Figure 5 shows the percentage of afro-colombians that belongs to Sisben levels 1 and 2 by region. Quite clearly, more blacks (in all regions) live in worse socioeconomic conditions than the rest of the population. For example, while 68% of afro-colombians in Valle belong to Sisben levels 1 and 2 only 35% of the rest of the population in that region do. Similarly, Figure 6 shows that the unemployment rate of blacks in almost all regions is higher than that of the rest of the population. A significant difference is observed in the case of the Atlantic region where the unemployment rate of afro-colombians is approximately 22% while the unemployment rate of the rest of the population in that region is only 12%.

The National Planning Department collected information from several sources[17] about 68 municipalities with large black populations (majority of the population) according to the 1993 Census (National Department of Statistics- DANE). Most of these municipalities are located in the Pacific and Atlantic regions, specifically in rural areas. The population of these municipalities corresponds to approximately 4.3% (1,957,077 people) of the total population.

Table 3 shows some basic measures of development of these municipalities compared to the national average. The municipal development index (calculated by the National Planning Department) is a composite of socioeconomic measures (education coverage, health, basic services and utilities, unsatisfied basic needs, etc.) and financial variables (like tax and non-tax income per capita, expenditures per capita, etc.). The scale of this index is 0 to 100 with 100 indicating the maximum degree of development and 0 complete lack of development. According to the results presented in

[14] It is common to consider individuals who report being "raizal del archipiélago" as afrocolombians. See CONPES #3310 (2004).
[15] We refer to minorities as afro-colombians, indigenous, raizal del archipiélago and gypsies.
[16] Socioeconomic strata measured in a scale from 1 to 6, with 1 being the lowest socio-economic level and 6 the highest.
[17] Education Ministry, Labor and Health Ministry, National Department of Statistics and ICFES.

Table 2, this index averages 30.6 in the 68 municipalities with large black populations while the national average is 38.1.

The percentage of people with unsatisfied basic needs (UBN) is 21 percentage points higher than the national average of the total 1,098 municipalities in the country, which is equal to 40%. At the same time, the coverage of basic household utilities is lower than the national coverage (for example, only 46% of households in these 68 municipalities have electricity while the national average is 70%). Additionally, these municipalities with large black populations exhibit higher illiteracy rates than the rest of the country (23% vs. 16%). These measures indicate that minorities in these municipalities exhibit poorer social and economic status than the rest of the Colombian population.

The National Planning Department also documents the fact that none of these municipalities achieved any of the six goals in vaccination coverage established at the national level (71.2%). In particular, none of these municipalities achieved more than 57% of coverage. Similarly, while the rate of risk for malaria has been set at 2,377 per 10 thousand inhabitants at the national level, this rate corresponds to 7,825 per 10 thousand inhabitants in these 68 municipalities.

4.2. Health Outcomes and Access to Health Care

4.2.1. Living Standards Survey, 2003

Figures 7 through 9 provide some basic information about access to health care insurance. According to the LSS, in 2003 approximately 31% of non-minority population in Colombia did not have access to health care insurance (see Figure 7). This proportion was equal to 48% in the case of racial and ethnic minorities (black and indigenous populations). From the covered population, most minorities were covered by the subsidized regime (19.36% of total minorities) while 32.85% of total non-minorities were affiliated to the contributive regime.

In Figure 8 we present information about access to health care insurance by racial/ethnic group. It is clear that afro-colombians' health insurance situation is more critical than that of indigenous groups. Approximately 53.8% of blacks did not have health insurance in 2003 while this proportion was equal to 37.9% in the case of indigenous groups. Most of the insured indigenous population was affiliated to the subsidized regime compared to only 10.64% of blacks. In Figure 9 we can observe that most minorities that are insured are so through Sisben[18] or because they belong to a "resguardo" [19] (36% and 16%, respectively) while most of the insured non-minorities are affiliated through a family member who works (40% of the total non-minority population).

In regards to health status, Figure 10 shows the distribution of self-reported health status of minorities and non-minorities using data from the LSS. In particular, the health outcome corresponds to a self-reported measure of excellent-to-poor health on a 1 to 4 scale. The measure is equal to 1 if the individual reported that his/her health status is excellent, 2 if it is good, 3 if it is fair and 4 if it is poor. These distributions are significantly different at 99% confidence level. According to these results a lower percentage of minorities characterize their health status as either very good or good (65.8% vs. 74.6% in the case of non-minorities) while a higher proportion of indigenous groups and

[18] Subsidized health insurance offered to individuals in socioeconomic Sisben levels 1 and 2.
[19] Indian reservations.

blacks characterize their health as fair (30.7% vs. 22.7%) or poor (3.5% vs. 2.8%) with respect to their non-minority counterparts. This information might be suggestive of significant differences in health status between minorities and the rest of the population in Colombia. However, one has to be careful when interpreting self-reported health measures. As it has been well documented, these measures are prone to error and highly correlated to other variables such as education and income[20].

In Table 4a we turn to additional variables that measure individuals' health. In spite of being self-reported they provide a more accurate measure of health than the widely used excellent-to-poor scale. Ideally, one would rather use anthropometric measurements such as height-for-age and weight-for-height which are thought to be more objective indicators of child health. Unfortunately the LSS, which by the way is the only survey that contains a race/ethnic question, does not include any anthropometric measures.[21]

Table 4a presents the percentage of individuals (in a given racial/ethnic group) that report a certain health related episode as well as the p-value of a χ^2 test for statistical significance of the difference between minorities and the rest of the population. According to this information, the incidence of chronic diseases is higher among non-minorities than minorities (14.2% vs. 12.9%) and this difference is statistically significant at 99% confidence level. The rate of occurrence of an illness episode within the last 30 days is not statistically different between minorities and the rest of the population. This rate is equal to 11.73% for minorities and 11.45% for the rest of the population. For those people who experienced an illness episode during the last 30 days, the number of days in which normal activities were interrupted due to that illness is higher for minorities (5.88 days) than for non-minorities (5.37 days) and this difference is statistically significant.

Additionally, from the group of individuals that experienced a recent illness episode, approximately 68% of minorities sought professional treatment while 72% of non-minorities did. This is clearly related to the health care insurance status of minorities which we documented earlier in this section (see Figures 7 through 9). From the group of people that sought for professional care during an illness episode, 76% of minorities were prescribed medicine while approximately the same fraction was prescribed in the case of their non-minority counterparts (the difference between the two rates is statistically insignificant). This might suggest that there is no strong discrimination effect in the provider-patient relationship which, has been provided as an explanation for race/ethnic health disparities in other countries.[22]

Finally, 5.6% of minorities reported having been hospitalized during the 12 months prior to the date of the interview while 6.77% of the rest of the population did, and this difference is statistically significant at 99% confidence level. This information suggests that minorities cannot be said to be worse off in terms of health than the rest of the population. In particular, more non-indigenous and non-blacks report to suffer from a chronic disease while approximately the same fraction of minorities and non-minorities report having experienced an illness episode within the last 30 days. Additionally, a higher proportion of non-minorities report having been hospitalized within the 12

[20] See Manning et al., 1982.
[21] For this reason, we also use data from the evaluation of the "*Familias en Acción*" program which does not contain a race /ethnic question but includes the more reliable anthropometric measures. We approximate the population of minorities in this sample by using the information available in the LSS (we explain this in detail below).
[22] See for example Van Ryn and Burke (2002) for the U.S. case.

months prior to the date of the interview. The fact that a lower proportion of minorities who suffer from an illness seek professional help seems to be related to their health insurance status.

In Table 4b we present the same health outcomes but given by racial group. In other words, we separate indigenous populations from afro-colombians. These numbers indicate that members of indigenous groups are healthier than blacks given that their rate of incidence of chronic diseases is significantly lower (11.62%) than that for blacks(12.93%) and non-minorities (20.06%) as is the rate of occurrence of an illness episode within the last 30 days (7.21% vs. 12.94% and 12.93% respectively).

4.2.2. Evaluation of the *Familias en Acción* Program

As we mentioned before there is at least another survey that could be useful to look at, in particular, because it contains more reliable measures of health status such as anthropometric measures. We would like to use data from a recent survey conducted in 2002 for the evaluation of *Familias en Acción* a conditional cash transfers program adopted in rural areas in 2000 (this survey was used for the measurement of the baseline). This survey has been recently made available by DNP[23], and offers rich information on perceived morbidity, vaccination, and health outcomes in terms of weight and height (both at birth and at the time of the survey) for children (age 0-6). The survey was conducted in 122 municipalities (57 under treatment and 65 operating as control group).

Unfortunately, this survey does not contain a race/ethnicity question. So in order to obtain an approximate measure of race that we can use, we estimated a probit model using as dependent variable a dummy variable which equals 1 if the individual belongs to an ethnic minority and 0 otherwise using data from the LSS (2003). This model, of course, does not intend to capture any causal effects but rather to describe members of a minority group in terms of a set of observable characteristics that are highly correlated with their race/ethnicity. This will allow us to use this set of characteristics (like for example, variables that capture socioeconomic status and geographic location) to determine whether an individual is likely or not to be black/indigenous conditional on his/her observed characteristics.

In Table 5 we present the results of this probit. We found that the variables that are most highly correlated with being a minority are average years of schooling, the number of unsatisfied needs, the number of children in the household and a set of regional dummies. In fact this set of variables explains approximately 35% of the variation in the probability of being a minority. As expected, living in the Atlantic, Pacific, San Andres y Providencia or Amazonia/Orinoquia is significantly associated with a higher probability of being a minority.

Using the estimated coefficients of this model we calculate the predicted probability of being a minority using the same set of observed characteristics of the individuals in the evaluation of *Familias en Acción*. We then define an individual as being a member of minority group if his/hers predicted probability of being a minority conditional on observable characteristics is higher than the average predicted probability plus one standard deviation.[24] If instead of using this probit model to

[23] http://www.dnp.gov.co/01_CONT/EVALUACI/EVAL_RAS_BASES_DATOS_FA.HTM

[24] This threshold (25.6%) is chosen to guarantee that there is a reasonable fit to the percentage of minorities in the country and to regional patterns of concentration of minorities. In fact, we apply this criterion to the evaluation of *Familias en Acción* and obtain

assign individuals into minority and non-minority groups one assigns all individuals in municipalities with a majority of blacks and/or indigenous populations (according to information from the Census) to the minority group, the results do not change significantly.

In Table 6a we present a few self-reported health measures. The numbers reported in columns 2 and 3 correspond to the probability of being a minority (conditional on observed characteristics of the individual such as socioeconomic status and geographic location) given that the answer to the corresponding health question was "yes" or "no" respectively. For example, the first row of that table indicates that an individual is 64% likely to be a minority if he/she reported not having health insurance while an individual who reported having health insurance is only 34% likely to belong to a minority group. In other words, uninsured individuals are significantly more likely (almost twice as much) to be a black or indigenous.

Similarly, children younger that 6 years old who have been ill during the 15 days prior to the date of the survey (diarrhea or flu and fever) are slightly more likely to be black or indigenous than those who did not report an illness episode. However, this difference is not statistically significant. Children who ceased normal activities due to this illness episode are significantly more likely to belong to a minority (53.2%) than children who did not report a disruption in daily normal activities due to an illness episode (49.8%). Children that have been hospitalized within the 12 months prior to the date of the survey are equally likely to be black or indigenous (48%). In other words, individuals that have been hospitalized during this 12 month period are not more likely to belong to a minority group.

In terms of morbidity measures for individuals older than seven years old, the results indicate that neither, people who report an illness episode during the 15 days prior to the date of the survey nor those who were hospitalized during the 12 months prior to the date of the survey are significantly more likely to be black or indigenous than individuals who did not report an illness or a hospitalization episode.

Table 6b presents different measures of health status that are thought of as being more reliable than self-reported measures. For example, we show anthropometric measures of children and their mothers. In this case, the number in column 2 corresponds to the correlation between the health outcome and the probability of being a minority (conditional on observable characteristics of the individual). For example, the number in row 1 indicates that there is a negative (but insignificant) correlation (equal to -0.0346) between the child's birth weight and the likelihood that this child is black or indigenous. In other words, it is not more (significantly) likely that children with low birth weight belong to a minority group than to the rest of the population.

The correlation between length at birth and the likelihood of being a minority is also negative and insignificant. The child's height and weight at the date of the interview is strongly negatively correlated with the likelihood that the child is black or indigenous and this correlation (-0.051 and

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that approximately 10% of the individuals in the sample are black/indigenous. Additionally, 5% of individuals in the Atlantic region are minorities while this fraction is 100% in the case of the Pacific region and 19% for Valle del Cauca.

-0.065 respectively) is statistically significant at the 95% confidence level. In other words, underweight and shorter children are significantly more likely to belong to a minority group. Mother's height and weight at the date of the interview are also negatively correlated with the likelihood of being black or indigenous. However, this correlation is not significant.

Finally, the results in Table 6b indicate that there is a statistically significant negative correlation (equal to -0.055) between being below the height-for-age international standard and the likelihood of being a black or indigenous child. This means that children below the height-for-age international standard are significantly more likely to belong to a minority group. Similarly, we find a significant negative correlation between being underweight according to international standards and the probability of being a minority. In particular, this correlation is equal to -0.055 when using the weight-for-age measure and equal to -0.034 in the case of weight-for-height. This implies that children that are underweight by international standards are more likely to belong to a minority group.

In Tables 7a and 7b we present the same information as in Tables 6a and 6b except in this case we have assigned individuals to the minority or non-minority population groups based on their predicted probability of being a minority[25], so we can actually calculate percentages and means by population group. These tables reflect the same basic patterns but interpretation is more straightforward. In particular, minorities are significantly less likely to have health insurance (68% of minorities vs. 86.7% of the rest of the population).

Child's birth weight is significantly lower for minorities (3.4 kgs vs. 3.6 kgs) while child's length at birth is not significantly different between black and indigenous populations and the rest of the population. Child's and mother's height and weight at the time of the survey are significantly lower for minorities than for their non-minority counterparts. Finally, the number of standard deviations from the international height-for-age and weight-for-age standards are significantly higher for black and indigenous children than for the rest of the population. For example, while black and indigenous children are 1.07 standard deviations below the international height-for-age standard, non-minorities are 0.89 standard deviations below.

This information suggests that there exist health disparities between minorities and the rest of the population as measured by a set of anthropometric variables. This is interesting in the sense that data from both, the LSS and *Familias en Acción*, based on self-reported measures of health indicate that there are no significant differences between health outcomes of black and indigenous groups and the rest of the population. However, once one turns to more reliable measures of health status such as the anthropometric measures reported in Table 7b there is an indication that underweight and stunted children are significantly more likely to be black or indigenous.

5. The Statistical Model

The starting point for the empirical analysis is a theoretical model of health production *à la* Becker (Becker 1993) which constitutes the main building block in the health literature. According to this

[25] An individual is defined to be a minority is his/hers predicted probability is one standard deviation above the average predicted probability of being a minority conditional on observable characteristics.

framework, households produce certain goods like human capital and health using a number of inputs. Typically, the health production function is given by:

(1) $H_i = f(X_i, X_h, I_h, P_h, P_g, \mu_i, \mu_h)$

where H_i is a health outcome which depends on demographic characteristics of the individual i (X_i) and characteristics of the household (X_h), income of the household (given that the budget constraint implies that total income is distributed among medical care and other goods and services, such as food, which enhance health), a vector of goods prices P_g and health prices P_h. Finally, it depends on unobserved attributes of both individuals μ_i and households μ_h.

The main variable of interest is race which belongs to the vector X_i. If the associated regression coefficient is significant, it would imply that even after conditioning on a wide range of observable characteristics that include education, age and income, race itself explains part of the variation in health outcomes. Vector X_i includes as many observable characteristics as possible in order to avoid omitted variable bias. In other words, being black/indigenous might be highly correlated with low income, certain types of employment, residing in certain regions of the country, etc., which could be in turn, correlated with poor health outcomes. Omitting some of these relevant variables might induce a bias in the coefficient associated with the race dummy variable.

For instance, it seems plausible to argue that minorities and individuals with lower income will be more likely to be unemployed[26] which will significantly affect the probabilities of accessing and affording health care and thus, have an effect on the individual's health outcomes. Hence, excluding the individual's employment status from vector X_i could cause a significant bias on the coefficient associated with the race dummy variable since part of the effect of employment status will be attributed to race. Additionally, in terms of policy, this seems extremely relevant in the sense that if health inequalities are present, and the results indicate that the employment situation minorities plays an important role in explaining them, then there is potential for policy aimed at improving the status of minorities in Colombia.

Another example is associated with the region of residence and migration patterns of an individual. This seems particularly relevant in a country like Colombia in which the political conflict has created massive changes in migration patterns, particularly affecting minorities like indigenous populations and/or blacks who used to live in rural areas now affected by the conflict. These changes have affected the socioeconomic status of minorities in urban areas and increased the likelihood of participating in informal employment, which in turn, presumably affects health outcomes and access to health care. Again, excluding the region of residence and whether the individual has recently migrated could potentially induce a significant bias in the coefficient of interest, namely the one associated with race. Similarly, in terms of policy this seems extremely important since we can better understand the mechanism(s) through which the social and political conflicts have affected minorities with a particular focus on health.

Similarly, in order to assess the effect of race on access to health care we run the following regression:

[26] The evidence presented in Figure 6 suggests that this in fact the case.

(2) $AH_i = f(X_i, X_h, I_h, P_h, P_g, \mu_i, \mu_h)$

where AH_i indicates whether individual *i* is affiliated to a health care provider or not. Again, if the probit coefficient associated to race is significant, that would imply that even after controlling for a set of observable characteristics that include education, income and age, race itself explains part of the variation in access to health care.

5.3. Estimation Results

5.3.1. Living Standards Survey (2003)

We first present estimates of equation (2) using the LSS in Table 8a. The dependent variable is a dummy variable which equals 1 if the individual has health insurance, 0 otherwise. The results of the probit model turned out to be as expected. In particular, the probability of having health insurance increases with age[27] and is significantly higher for children younger than 12 years old. Being unemployed has a statistically significant negative effect on the probability of having health insurance while being employed with a contract has a positive and significant effect. The Sisben socioeconomic level has a very significant positive effect on the probability of having health insurance.[28] In other words, the probability of having health insurance is higher, the higher the socioeconomic status of an individual. Interestingly, being a male significantly reduces the probability of having health insurance. This might be due to the fact that women are very likely to be affiliated through their spouses' employer-sponsored health insurance plan.

All regional dummies are statistically significant in explaining access to health care insurance. The excluded category is Bogotá. That means that living in any other region of the country (except for San Andrés y Providencia) reduces the likelihood of having health insurance with respect to people who reside in Bogotá. This does not seem to be related to residing in a capital city which, by the way, turns out to be significant but negative (and somehow puzzling result). Hence, it might be related to other location-specific factors like the predominance of rural population, less availability of health care facilities, etc.

Finally, the race dummy variable (1 if indigenous/black, 0 otherwise) turns out to be negative but statistically insignificant. However if one estimates the same equation but using three different ethnicity dummies instead of a single race dummy variable, i.e., a dummy variable for whether the individual is black or not, another dummy variable for whether the individual belongs to an indigenous group or not and finally a dummy for whether the individual belongs to another minority group or not, the results are strikingly different. As can be seen in Table 8b, if an individual is black the probability of having health insurance significantly decreases (even conditioning on socioeconomic variables and regional dummies) while the opposite is true for individuals that belong

[27] Age squared does not turn out to be statistically significant.

[28] An alternative model that includes (log) expenditures per capita, the number of unsatisfied basic needs and education was also estimated. As expected, results indicated that the expenditures and education increase the probability of having health insurance while the unsatisfied basic needs (UBN) index decreases it. However, these variables turn out to be insignificant if Sisben level is also included because of strong multicolinearity. However, the model presented in Table 8 is more powerful (R^2 is 0.1363 vs. 0.098) which probably indicates that Sisben level has a higher predictive power given that it captures additional features of socioeconomic status like the characteristics of the individual's home and the neighborhood of residence.

to indigenous populations. There is no significant effect of belonging to another minority group on the probability of having health insurance.

The result according to which belonging to an indigenous group increases the probability of having health insurance might be explained by the fact that indians tend to be members of communities and this has can have two positive effects on access to health insurance. On one hand, the community acts as a network that allows individuals to be better informed and find help easier within members of their group. On the other hand, indian reservations are eligible for a special publicly funded health insurance plan.

These results suggest that even after controlling for the socioeconomic status of an individual, his/her employment status and geographic location, being black still has additional explanatory power on the probability of having health insurance. That means that while the fact that blacks have higher unemployment rates, are less likely to work in the formal sector, are less educated and in general, live in worse socioeconomic conditions than the rest of the population partly explains ethnic disparities in access to health care insurance (documented in Figures 7 through 9) there is still an unobserved ethnic-specific characteristic that reduces the probability of having health insurance.

A test for whether the model estimated on minorities only is equivalent to the one estimated on the rest of the population only suggests that these models are not statistically equivalent. In particular, the χ^2 statistic of joint significance is equal to 81.5 and the p-value to 0.0000 (Table 8c). That means that the effects of the explanatory variables on the probability of having health insurance are not always the same for minorities and for the rest of the population. Specifically, the effect of being unemployed is lower for minorities that for non-minorities, the effect of being employed with a contract is higher for minorities as is the effect of being in a higher socioeconomic Sisben level. Finally, there is a higher negative effect on the probability of having health insurance if a black/indigenous individual lives in the Pacific or in Valle del Cauca while the effect is less negative or more positive in the Atlantic and San Andres respectively. These results further explain why minorities are less likely to have health care insurance due to their disadvantageous socioeconomic and employment status.

Having estimated a model to explain the probability of having health insurance, we now turn to study the determinants of health outcomes by estimating equation (1) using data from the LSS (2003). In doing this, we want to control for health care insurance on top of a variety of observable characteristics of individuals. Quite clearly, the health status of an individual should depend on whether he or she has access to health care. However, the effect of having health insurance on health outcomes is likely to be biased given the fact that individuals who choose to have health insurance are systematically different from individuals who do not. In other words, there is self-selection of individuals into the group of insured and the characteristics of individuals that determine the insurance choice might be systematically correlated with unobserved characteristics of individuals that, in turn, determine health outcomes.

For this reason we estimate equation (1) using a method based on the propensity score. In particular, the regression for health outcomes includes a dummy variable that equals 1 if the individual is insured, 0 otherwise as well as the predicted probability of having health insurance obtained from

estimation of equation (2)[29]. This predicted probability is commonly known as the propensity score. In this case, the estimated propensity score plays the role of the control function. The idea is that the estimated propensity score should contain all the information in the covariates that is relevant for estimating the effect of the "treatment". In this case, treatment refers to participation in health insurance[30].

The results are presented in Table 9a. In the first column the health outcome corresponds to a self-reported health status measured by the excellent to poor scale. In particular, the scale is equal to 1 if the individual reported that his/her health status is excellent, 2 if it is good, 3 if it is fair and 4 if it is poor. The results of the ordered probit model indicate that access to health care is not significant in explaining individuals' perception about their own health. This is not surprising exactly because the health outcome corresponds to the individual's perception of his/her own health as opposed to his/her actual health status which one might expect to be associated with access to health care.

Additionally, we find that higher household expenditures per capita[31] are significantly associated with a lower rating, i.e., a better perception of one's health, as is the socioeconomic status measured by the Sisben level. Similarly, years of schooling and whether the individual is employed with contract have a positive and significant effect on self-reported health status (negatively correlated with the excellent to poor scale) as one would expect. Being unemployed has a significant negative impact on the individual's perception of her/his health status (positive correlated with the health status scale). Also, the higher number of durable goods in the household, which is meant to capture additional socioeconomic characteristics of the household, is significantly associated with a lower self-reported health rating, i.e., better perception of the individual's own health status.

Interestingly, the fact that a member of the household is an addict or alcoholic has a positive and significant effect on the health status rating, i.e. a negative effect on the individual's own perception of his/her health status. This variable is introduced to capture other social and cultural habits/characteristics of the household that are related to behaviors that affect the individual's exposure to health risks and cannot be fully captured by socioeconomic measures. We include a variable that equals 1 if at least one member of the household did not eat anything during an entire day because he/she did not have enough money to buy food, 0 otherwise in order to have a more crude proxy for economic hardship. In fact, a change in this variable from 0 to 1 has an adverse and significant effect on the individual's perception of his/her own health.

Males have a better perception about their own health than do women while older people are more likely to have a worse perception of their own health status, as one would expect. Finally, living in the Atlantic, Oriental, Pacific and Amazon regions is significantly associated with a worse perception of the individual's health status relative to the excluded category (Bogotá) while the opposite happens with individuals living in Antioquia and San Andres y Providencia. These regional dummies are meant to capture location-specific features that might be associated with differential exposure to health risks. For example, different climate, proximity to the ocean or the jungle,

[29] Results presented in Table 8.

[30] The following are the exclusion restrictions that identify the two stage model: whether the individual works with contract or not, whether the individual is currently studying or not and whether the individual resides in a capital city.

[31] Given that household expenditures are expected to be endogenous what we include in this regression is predicted household expenditures based on a model which includes as explanatory variables average age (and age squared) and education of adult members.

altitude, humidity, types of food more readily available, quality of the water, etc. At the same time, they are meant to capture regional-specific cultural traditions, habits and/or beliefs that are potentially associated with individuals' behaviors as well as other location-specific characteristics such as the penetration of the armed conflict which might affect the stress level and well-being of inhabitants of the region and hence, have a significant effect on their health outcomes. These regional dummies turn out to be quite significant in explaining the variation in the self-reported health status scale.

The dummy variable that indicates whether the individual belongs to a minority group or not is insignificant in explaining the individual's perception about his/her own health. In other words, after controlling for a comprehensive set of socioeconomic characteristics of the individual, the race or ethnic group of the individual does not contain any additional explanatory power. This means that the differences in self-reported health status by race/ethnicity reported in Figure 10 are completely explained by the fact that minorities live in worse socioeconomic conditions, are less likely to be employed in the formal sector, less educated, more likely to experience economic hardship and more likely to live in regions characterized by higher exposure to health risks than the rest of the population and not associated with being a minority *per se*.

The fact that the fit of the model is fairly good (R^2 equal to 0.1245) and higher than the fit of all the other models in Table 9a provides further evidence that a self-reported health measure such as the excellent-to-poor health status scale is prone to be highly correlated with socioeconomic characteristics such as education and income and to be measured with error. In this sense, it might not be a very reliable measure of health.

The second column in Table 9a reports the results of estimation of equation (1) using as a dependent variable a dummy that equals 1 if the individual reports to have a chronic disease (such as diabetes, hypertension, etc.) and 0 otherwise. The results indicate that the prevalence of a chronic disease is less related to socioeconomic characteristics such as the socioeconomic Sisben level, the number of durable goods in the household and whether the individual was unemployed than was the self-report health status scale (column 1 in Table 9a). This makes sense since one would expect chronic diseases to be explained more by unobserved characteristics of the individual given that they tend to be highly associated to genetic and heritable features and less so by their socioeconomic conditions. Surprisingly, however, log expenditures per capita are associated with a higher probability of having a chronic disease. This might suggest that individuals who are economically better-off are more likely to be exposed to stress and/or other habits (like lower likelihood of exercising) that might be, in turn, associated with higher incidence of chronic diseases.

It is interesting to note that access to health insurance is positively (and significantly) associated with the probability of having a chronic disease. This might be a case of inverse causality in the sense that being insured actually increases the probability of diagnose of a chronic disease. Men are more likely to have a chronic disease as are older people. In fact, age explains much of the variation in the prevalence of chronic diseases. Additionally, age squared is positive and significant. This implies that each additional year of age has a greater negative effect on health. As expected, education is negatively (and significantly) correlated with the probability of having a chronic disease as is being employed with a contract. Additionally, the fact that a member of the household is alcoholic/addict is associated with a higher probability of chronic disease as is evidence of economic hardship (a member of the household did not eat anything during at least one day involuntarily). An interesting

result indicates that people who migrate (a dummy variable which equals 1 if the place of residence is different from the place of birth, 0 otherwise) have a lower probability of chronic disease.

Most of the regional dummies are statistically significant in explaining the prevalence of chronic diseases except for San Andrés y Providencia y Amazonia/Orinoquia. In particular, living in the Atlantic Region (compared to Bogotá, the excluded category) is associated with a lower probability of chronic disease while living in any of the other regions is positively correlated with this probability. Again, these regional dummies capture location-specific features not controlled for that capture differential exposure to health risks like climate, different food and/or water, bugs, vegetation, etc. as well as other location-specific characteristics that affect behaviors like culture, folklore or even the armed conflict.

Finally, the race dummy variable is insignificant in explaining the prevalence of chronic diseases. This means that the observed difference in the prevalence of chronic diseases between black/indigenous groups and the rest of the population[32] is fully explained by differences in access to health care insurance, log expenditures per capita and geographic location.

In the third column of Table 9a we present the results of estimating equation (1) by using as a health outcome a dummy variable equal to 1 if the individual experienced an illness episode (which did not imply hospitalization) within the 30 days prior to the date of the interview. The fit of this model is considerably poor with an R^2 of only 0.0167. In fact, one would expect an illness episode to be highly associated with idiosyncratic and random shocks like the propagation of a virus or bad weather which we are unable to control for[33]. Still, the explanatory variables are jointly significant but account for a very low portion of the variation in the prevalence of illnesses within the last 30 days.

Some of the results are actually unexpected. In particular, having health insurance is positively and significantly correlated with the probability of an illness episode. Again, in this case it might also be possible that having access to health care increases the likelihood of diagnose of an illness that would otherwise be overlooked by the individual. Somewhat surprising results indicate that log expenditures per capita, socioeconomic Sisben level and being employed with a contract are positively correlated with the possibility of an illness episode. Although speculative, a possible explanation could be associated with higher levels of stress and exposure to health risks (due, for example, to traveling, interacting with a larger number of people, lower likelihood of exercising, etc.) associated with working and having a higher socioeconomic level. However, the number of durable goods in the households is negatively correlated with the probability of an illness episode.

On the other hand, education is negatively correlated with the probability of an illness episode as expected. This would imply that better educated people have a better idea of how to avoid health risks or prevent illnesses overall. Again, males are more likely to report an illness episode than women as well as older people. Economic hardship (as measured by a variable that indicates whether at least one member of the household did not eat during an entire for lack of money to buy food) is significantly positively correlated with the probability of having an illness.

[32] This difference, by the way, is in favor of black and indigenous populations (see Table 4a).

[33] It is worth reminding the reader that the R^2 associated with the self-reported excellent-to-poor health status regression is significantly higher and equal to 0.126 which is in agreement with the idea that this variable is highly correlated with characteristics of the individual compared to other measures of health that are thought as more "objective".

The regional dummies are all highly significant in explaining illness episodes. This is further evidence in favor of the idea that this kind of health outcome should be associated to random shocks or location-specific shocks like changes in weather or the propagation of a virus in a certain region. In particular, the probability of having an illness within 30 days prior to the date of the interview is higher for people living in other regions of the country with respect to those who live in Bogotá. This might be associated with the fact that other regions have higher health risks.

Finally, the minority dummy variable is negative and statistically significant. That means that black and indigenous individuals have a lower probability of having been ill during the last 30 days. In other words, after controlling for access to health care, socioeconomic and cultural characteristics and geographic location, non-minorities are actually more likely to get sick than blacks and indigenous populations[34]. To explore this result further, we ran a fully interacted model, i.e., all the explanatory variables are interacted with the minority dummy variable and included in the original model (as suggested in Section 2). The results (first column in Table 9b)[35] indicate that the model run with minorities only is statistically different from the model run with non-minorities only. This implies that part of the negative effect of being a non-minority on the probability of experiencing an illness episode during the past 30 days is related to the fact that the effects of some of the explanatory variables are significantly different for minorities than for the rest of the population.

For example, the effect of higher socioeconomic status on the probability of having been ill during the last 30 days is positive and significant for non-minorities while the effect of a higher socioeconomic status on the probability of being ill is negative and significant in the case of black and indigenous populations. This means that while being economically better-off is actually bad in terms of non-minorities' health status[36], the opposite occurs in the case of black and indigenous populations. Something similar happens with the effect of having a job (with contract). The intuition in this case is the same. The coefficient of the race dummy variable in the fully interacted model is negative and still significant. This means that while part of the difference between minorities and non-minorities can be explained by the difference in the effects of the explanatory variables, part is due to unobserved characteristics that we are not controlling for.

Finally, column 4 in Table 9a reports results in the case in which the health outcome is a dummy variable equal to 1 if the individual was hospitalized within the 12 months prior to the date of the interview, 0 otherwise. Once again, having access to health care is associated with a higher probability of being hospitalized. As before this might be related to the fact that if an individual is insured then the probability that an illness is diagnosed and the individual is sent to the hospital or just the probability that the individual goes to the hospital in case of an emergency increases.

Log expenditures per capita are not significant in explaining hospitalization episodes while the socioeconomic Sisben level is positively associated with the probability of being hospitalized. Additionally, education reduces the probability of having been hospitalized and males are more

[34] The difference in the occurrence of an illness episode between minorities and non-minorities reported in Table 4 was actually in favor of non-minorities.

[35] Note that only when the race dummy variable turns out to be significant we run a fully-interacted model in order to explore this result. We do this to better understand the source of these ethnic disparities.

[36] As we mentioned earlier, this might be due to the fact that being economically better-off is, in turn, associated with less healthy habits like working in excess, exercising less, bad eating habits, etc.

likely to experience a hospitalization episode than women as are older people. Just as in the case of an illness episode (column 3), the probability of having been hospitalized is positively (and significantly) related to being employed with contract. It is possible, for example, that working individuals with higher socioeconomic characteristics are exposed to higher health and accident risks related to their job (for example, high stress, little rest, bad eating habits, traveling, etc.) and that causes a positive correlation. This hypothesis is plausible especially since the number of durable goods in the households turns out to be insignificant. This could mean that socioeconomic level and employment status do not affect the health outcome by proxying for how well-off an individual is but rather through a different mechanism.

Economic hardship is positively correlated with the probability of having been hospitalized. Only a few regional dummies are significant in explaining episodes of hospitalization. In particular, living in the Central region, in Antioquia or Valle del Cauca reduces the probability of having been in the hospital (with respect to residing in Bogotá) while living in San Andrés or the Amazonia increases the probability. Finally, the dummy variable that indicates whether an individual is black/indigenous is negative and significant. In other words, after controlling for socioeconomic characteristics, access to health insurance and geographic location, being part of a minority group reduces the probability of having been hospitalized.

To understand this better we ran the fully interacted model (second column in Table 9b). Note that some of the effects of the explanatory variables on the probability of being hospitalized vary depending on whether the individual belongs to a minority or not. For example, the effect of being employed with a contract is significantly higher for non-minorities than for blacks and indigenous populations. It could be, for example, that for non-minorities jobs are a source of stress and are linked to a particular lifestyle that is associated with a higher probability of having a serious illness and/or accident (and hence be hospitalized) like bad eating habits, little rest and exercising, etc. while this effect is less strong in the case of minorities.

It is worth mentioning that we also ran the models presented in Table 9a separately for men and women. Results are uninteresting except for the fact that a dummy variable that indicates whether a woman has a child younger than 2 years old is always significant in explaining health outcomes except in the case of a chronic disease as one would expect.

5.3.2. *Familias en Acción*

In Table 10 we present estimates of the access to health insurance equation (equation (2)) using data from the evaluation of the *Familias en Acción* program. Just as before, the dependent variable is a dummy that equals 1 if the individual has health insurance and 0 otherwise. The Sisben socioeconomic level is not available in this survey[37]. For this reason we replaced this variable with log expenditures per capita and the unsatisfied basic needs (UBN) index.

The probability of having health insurance increases with age and it is significantly higher for children younger than 12 years old (as we found to be the case in the LSS). A higher educational attainment is significantly associated with a higher probability of having health insurance. Unemployment is not significant in explaining access to health insurance while the probability of

[37] The sample of *Familias en Acción* is basically a sample of families in socioeconomic Sisben level 1.

having insurance increases if the individual is employed and receives severance payments[38], as expected. After controlling for education and type of employment, log expenditures per capita do not significantly explain access to health insurance. On the other hand, the probability of having health insurance is significantly lower the higher the number of unsatisfied basic needs. Males are less likely to be insured as are individuals who live in rural areas. The set of regional dummies is significant in explaining the variation in access to health insurance. In particular, the probability of having health insurance is higher in every region compared to the Atlantic region (the excluded category).

Finally, the minority dummy variable is negative but insignificant. In other words, after controlling for socioeconomic characteristics, employment status and geographic location, being a member of a minority group does not have additional explanatory power in explaining the variation in access to health insurance.[39]

We now turn to estimation of equation (1) using health outcomes available in the evaluation of the *Familias en Acción* program. Some of the health outcomes measured in this evaluation coincide with the ones reported in the LSS, e.g., self-reported recent episodes of illness and hospitalization. As we have mentioned before, these self-reported measures can be very prone to measurement error and very likely to be highly correlated with the socioeconomic status of the individual. For this reason, we want to restrict ourselves to the anthropometric measures available in this survey.

In Table 11 we present the results. The dependent variables are the height-to-age, weight-for-age and weight-for-height measures.[40] In particular, each variable is given by the number of standard deviations from the international standard of the corresponding measure. Hence a negative number indicates that the child is below the international standard and the opposite is true if the number is positive. It is worth reminding the reader that for both minorities and non-minorities the average of these variables is negative which indicates that the Colombian population is below the international standards for both height and weight for age. As expected, the results indicate that the deviation of height and weight for age from international standards is positively correlated with log expenditures per capita, although only significant in the case of height. Additionally, these measures are negatively correlated with the number of unsatisfied basic needs, as one would expect, but the coefficient is only significant in the case of weight-for-height.

A very interesting result indicates that while the average schooling attainment of the child's parents is positive and very significant in explaining weight variation it is insignificantly related to height. This is in agreement with the basic intuition that weight is likely to be associated with healthy behaviors like eating habits, the likelihood of exercising, etc., and these in turn, tend to be highly correlated with education while height is typically thought of as being associated with heritable features.

A somehow puzzling result indicates that having health insurance is associated with lower height and weight for age as well as lower weight for height compared to international standards. However, this coefficient turns out to be significant only in the case of height. As one would expect, child's

[38] This is included as a proxy for formal employment.
[39] Since the race dummy variable does not turn out to be statistically significant we do not need to run a fully-interacted model.
[40] Similar regressions were ran using infant mortality, weight at birth and length at birth but the results were completely meaningless.

height and weight are highly correlated with mother's height and weight respectively. This is due to the fact that both are thought of as features that are highly inheritable.

While log expenditures per capita and unsatisfied basic needs do not seem to significantly explain much of the variation in height and weight, the number of durable goods in the household is always significantly associated with higher height-for-age, weight-for-age and weight-for-height. This variable might be capturing somehow different aspects of the status of a household (different from income *per se*) that proxy for cultural and/or social behaviors that are closely related to health. For example, owning a vacuum cleaner, a refrigerator or a washing machine might be associated with healthier and cleaner environments.

The child's height and weight is unrelated to whether the child went to medical control prior to the date of survey as well as to his/her specific geographic location. It seems like the only feature about location that matters is whether it is rural or urban. In particular, living in a rural area is associated with higher height-for-age and weight-for age. Finally, the minority dummy variable is insignificant in explaining differences in all of the anthropometric measures showed in Table 12[41]. In other words, once we control for socioeconomic status (in particular, parents' education), access to health insurance, mother's height/weight and geographic location, being a minority does not explain any of the observed differences in weight and height measures.

In sum, children's anthropometric measures are mostly explained by variables that capture either cultural/social characteristics related to healthier habits or inheritance and less so by socioeconomic status *per se*. In particular, education is highly significant and reflects the idea that weight is highly explained by behaviors such as eating habits and the importance of exercise in daily life. On the other hand, the height and weight of the mother is always highly significant in explaining the variation of child's height and weight respectively which highlights the importance of heritable features.

6. Concluding Remarks and Policy Recommendations

Studies about social and economic exclusion of minorities (defined by race and ethnicity) in Colombia are rather scarce. Furthermore, the literature about racial and ethnic health disparities is basically inexistent. This paper is an attempt to document the socioeconomic situation of black and indigenous populations in Colombia with a particular focus on health outcomes and access to health care. Additionally we setup a statistical model to test whether health racial disparities remain after controlling for a broad set of socioeconomic characteristics of individuals.

We use data from the Living Standards Survey (2003), data collected by the National Planning Department for 68 municipalities with a majority of black population and data from the evaluation of the *Familias en Acción* program to document the situation of minorities in the country and understand the source of racial and ethnic health disparities. Some basic stylized facts indicate that minorities (who account for approximately 9.2% of the Colombian population) are worse off in terms of socioeconomic status (Sisben level), income, unemployment rates, access to formal

[41] Again, given that the race dummy variable is statistically insignificant we do not need to run a fully-interacted model which would be useful to understand the source of ethnic disparities if there is evidence that these are present at all.

employment, unsatisfied basic needs, education and access to basic utilities (water, electricity, sewer).

In regards to health, minorities are significantly less likely to have health insurance. In particular, while 31.41% of non-minorities do not have health insurance, 48% of black and indigenous populations do not. Also minorities have a worse perception of their own health status (according to data from the LSS) than the rest of the population and a higher likelihood of having been ill during the 30 days prior to the date of the interview but are less likely to suffer from a chronic disease or having been hospitalized within the 12 months prior to the date of the interview than non-minorities. In sum, evidence from self-reported health measures suggests that there are no significant differences (at least against minorities) in health outcomes between racial/ethnic groups.

Additionally, data from the evaluation of the *Familias en Accion* program suggests that child's birth weight is significantly lower for minorities as is the deviation of height-for-age and weight-for-age from international standards. For example, while black and indigenous children are 1.07 standard deviations below the international height-for-age standard, non-minorities are 0.89 standard deviations below. This evidence suggests the existence of health disparities between minorities and the rest of the population at least as measured by a set of anthropometric variables.

For most part, results from the statistical models setup to study the determinants of access to health care and health outcomes suggest that health disparities disappear once we control for socioeconomic characteristics, employment, geographic location, etc. In other words, differences in socioeconomic level, access to formal employment, unemployment rates, income and geographic location fully account for these disparities.

A notable exception indicates that if an individual is black the probability of having health insurance significantly decreases (even conditioning on socioeconomic variables and regional dummies) while the opposite is true for individuals that belong to indigenous populations. This result is obtained by using access to health care information from the LSS (2003). This result is associated with the fact that being a member of an indigenous group can have two positive effects on access to health insurance. On one hand, the community acts as a network that allows individuals to be better informed and find help easier within members of their group. On the other hand, indigenous reservations (*resguardos*) are eligible for a special publicly funded health insurance plan under the subsidized regime.

In the case of health outcomes, the results presented in this paper suggest that after controlling for socioeconomic characteristics, employment status and geographic location, the minority dummy variable turns out to be insignificant in explaining the variation in health outcomes. In other words, the racial and ethnic disparities in access to health care insurance can be fully accounted by the fact that minorities are worse off in almost every single socioeconomic dimension (employment, education, income, etc.).

In particular, once we control for a comprehensive set of individual characteristics, the race dummy variable turns out to be insignificant in explaining differences in self-reported health status (according to the excellent-to-poor scale). That means that the fact that minorities have a worse perception about their own health is associated with the fact that they have lower expenditures per capita, lower socioeconomic Sisben level, lower education, are less likely to be employed with a

contract and more likely to be unemployed. Similarly, the fact that non-minorities are more likely to suffer from a chronic disease can be fully accounted for by their socioeconomic characteristics, employment status and geographic location and is unrelated to race *per se*.

We also find that the probability of having experienced an illness episode during the 30 days prior to the interview date and the probability of having been hospitalized during the previous 12 months is significantly explained by race and this effect remains even after controlling for socioeconomic characteristics of individuals. In particular, minorities are less likely to experience an illness episode and to be hospitalized. To further understand this result we ran a fully interacted model. The results indicated that part of this is due to the fact that the effects of some of the explanatory variables on these particular health outcomes are different for minorities and non-minorities. For example, the effect of higher socioeconomic status on the probability of having been ill during the last 30 days is positive and significant for non-minorities while the effect of a higher socioeconomic status on the probability of being ill is negative and significant in the case of black and indigenous populations.

Finally, using data from the evaluation of the *Familias en Accion* program we show that differences in height and weight to age (with respect to international standards) between blacks and indigenous populations and the rest of the population are fully accounted for by the family's socioeconomic status, parents' education, inheritance and geographic location. In other words, after controlling for this set of variables, the race dummy variable does not have any additional explanatory power in explaining the variation in weight and height measures.

A very interesting result indicates that while the average schooling attainment of the child's parents is positive and very significant in explaining weight variation it is insignificantly related to height. This is in agreement with the basic intuition that weight is likely to be associated with healthy behaviors like eating habits, the likelihood of exercising, etc., and these in turn, tend to be highly correlated with education while height is typically thought of as being associated with heritable features.

The implications of these results in terms of policy are straightforward. Racial and ethnic disparities in health outcomes and access to health care exist mainly because minorities are worse off in terms of socioeconomic status (Sisben level), income, unemployment rates, access to formal employment, unsatisfied basic needs, education and access to basic utilities (water, electricity, sewer).

Given this, it is clear that policy should be designed with the objective of improving the socioeconomic status of minorities in the country instead of aimed at changing the structure of institutions, for example, health care providers. In particular, it seems like education plays a very important role as does access to formal employment. Policies aimed at increasing education coverage and improving literacy rates in regions of the country with high concentration of black and indigenous populations can prove useful in improving minorities' health outcomes and access to health care. A possibility could be to consider implementing affirmative action policies for schools and universities.

This alone could also increase the access of minorities to formal employment which, in turn, is associated with better health outcomes and higher probability of having health insurance according to the results presented in this paper. High unemployment rates in some regions of the country can be significantly contributing to the disadvantageous health situation of minorities. Hence, policies

aimed at improving labor market outcomes in general could improve the overall status of minorities and hence reduce racial/ethnic socioeconomic and health disparities.

However we find that blacks are worse off in terms of access to health care even after conditioning on a wide range of individual characteristics while the opposite is true in the case of indigenous populations. This suggests that a public policy design to provide access to health care to afro-colombians through a publicly funded system, similar in nature the one that is available for indigenous reservations, could prove extremely useful in reducing ethnic disparities in access to health care. In other words, we find the significant differences between blacks and indigenous groups are related to policy choices, specifically in the context of insurance provided by the government.

Further research aimed at understanding the reasons why minorities have less access to education and formal employment would be useful in understanding the possible consequences of implementing a policy like affirmative action.

References

Alleyne, G., J. Casas and C. Castillo-Delgado, 2000, "Equality, equity: why both er?", *Bulletin of the World Health Organization 78(1):* 76-66.

Balsa, A. T. Mcguire and L. Meredith, 2004, "Testing for Statistical Discrimination in Health Care", manuscript Harvard Medical School, February.

Barbujani, G., et al., 1997, "An apportionmen t of human DNA diversity", *Proc. Natl. Acad. Sciences*, 94: 4516-19.

Braun, L.,2002, "Race, Ethnicity and Health", *Perspectives in Biology and Medicine*, Vol.45, No. 2: 159-74.

CONPES No. 3310, 2004,"Política de Acción Afirmativa para la Población Negro o Afrocolombiana", Departmento Nacional de Planeación, República de Colombia.

LaVeist, T., ed., 2002, *Race, Ethnicity and Health, A Public Health Reader*, Jossey-Bass.

Cooper, R.S., "Race, genes and health –new wine in old bottles?" *Int Journal of Epidemiology*, 32:1-22.

Filmer, D. and L. Pritchett, 1999, "The effect of household wealth on educational attainment: evidence from 35 countries", *Population and Development Review 25* (1):85-120.

Flórez, C., C. Medina and F. Urrea, 2003, "Los costos de la exclus ion social por raza o etnia en América Latina y el Caribe", *Coyuntura Social No. 29,* Diciembre.

Krieger, N. And S. Sideny, 1996, "Racial discrimination and blood pressure: The CARDIA study of young black and white adults", *American Journal of Public Health*, 86:1370-78.

Lewontin, R., 1972, "The apportionment of human diversity", *Evol. Biol.* 6:381-398.

Manning, W.G., J.P. Newhouse, J.E. Wage, 1982, "The Status of Health in Demand Estimation: Byeond Excellent, Good, Fair and Poor", In Fuchs, V. (eds.) *Economic Aspects of Health*. University of Chicago Press, Chicago.

Patrinos, H., E. Velez and G. Psacharopoulos, 1993, "Language, Education and Earnings in Asunción Paraguay".

Psacharopoulos, G. and H. Padrinos, 1994, "Los Pueblos Indígenas y la Pobreza en América Latina: Un Análisis Empírico", Estudios Sociodemográficos en Pueblos Indígenas, Serie E, No. 40, Santiago de Chile, División de Población, Centro Latinoamericano y Caribeño de Demografía.

Risch, N., Burchard, E., Ziv, E. and H. Tang, "Categorization of humans in biomedical research: genes, race and disease", *Genome Biology* No. 3, 2002.

Van Ryn, M. and J. Burke, "The Effect of Patient Race and Socioeconomic Status on Physicians' Perception of Patients" In La Veist (ed.) *Race, Ethnicity and Health*. Wiley Print.

Wagstaff, Adam, 2002, "Inequality Aversion, Health Inequalities, and Health Achievement", World Bank Workinig Paper, January.

Wagstaff, Adam, 2002, "Inequalities in Health in Developing Countries: Swimming Against the Tide?", World Bank Working Paper, February.

Table 1. Inequalities in Mortality, Malnutrition and Morbidity among Children

Region	IMR	U5MR	Stunting	Underweight	Diarrhea	ARI
Asia, Near-East and North Africa	-0,1147	-0,1345	-0,1600	-0,1660	-0,0407	-0,0155
Latin America & Caribbean	-0,1491	-0,1722	-0,2605	-0,2796	-0,0851	-0,0458
Sub-Saharan Africa	-0,0772	-0,0891	-0,1031	-0,1275	-0,0048	-0,0458
Colombia	-0,1207	-0,1306	-0,2376	-0,2929	-0,0867	-0,0174
Average	-0,1025	-0,119	-0,1512	-0,1696	-0,0512	-0,0323

Source: Wagstaff (2002), Table 2 using Demographic and Health Survey (DHS) data.

Table 2. Description of Minorities in LSS (2003)

	Minority	Rest
% of group in Sisben levels 1 and 2	49,43	25,6
% of group in income quintil 1 and 2	49,1	45,0
Schooling coverage	77,7	84,1
Number of persons in household	4,38	3,85
Number of children in household	1,39	1,04
Schooling level head of household	5,88	6,78
Schooling level members older 17 yrs	6,47	7,39
% of group without unsatisfied basic needs	53,0	79,3

Source: LSS (2003)

Table 3. Measures of municipal development

	68 municipalities	National average
Municipal development index	30,62	38,11
% of households with water	39,85	57,13
% of households with sewer	19,53	32,44
% of households with electricity	46,20	69,57
% of households without Unsatisfied Basic Need	41,04	60,41
# of rooms per person	0,47	0,55
% of literacy	76,54	83,66

Source: National Planning Department, CONPES # 3310.

Table 4a. Health Status of Minorities
(Percentage of racial/ethnic group)

	Minority	Rest	$Pr(\chi^2)$
Chronic Disease	12,91	14,16	0,002
Occurrence of illness episode last 30 days	11,73	11,45	0,000
No. of days stopped normal activities due to illness	5,88	5,37	0,000
Sought professional treatment for that illness	68,04	71,57	0,008
Prescribed medicine during illness episode	76,05	76,2	0,926
Has been hospitalized within last 12 months	5,68	6,77	0,000

Source: LSS, 2003.

Table 4b. Health Status of Minorities
(Percentage of racial/ethnic group)

	Indigenous population	Afro-Colombians	Other minorities	$Pr(\chi^2)$
Chronic Disease	11,62	12,93	20,06	0,000
Occurrence of illness episode last 30 days	7,21	12,94	12,93	0,000
No. of days stopped normal activities due to illness	6,30	5,75	12,10	0,000
Sought professional treatment for that illness	69	66,49	96,72	0,000
Prescribed medicine during illness episode	63,4	75,46	98,02	0,000
Has been hospitalized within last 12 months	5,57	5,26	11,38	0,000

Source: LSS, 2003.
Other minorities include gypsies and "raizal del archipiélago"

Table 5. Probability of Being Minority conditional on Observables

Dep. Var.-> Minority	Coefficient	Std. error	
Average years of schooling	-0,00320	(0,0018)	*
Unsatisfied Basic Needs	0,13672	(0,0103)	**
Number of children in household	0,06458	(0,0059)	**
Atlantic Region	0,86090	(0,0562)	**
Oriental Region	-0,39330	(0,0551)	**
Central Region	-0,24300	(0,0000)	**
Pacific Region	2,11892	(0,0217)	**
Antioquia	-0,04340	(0,0401)	
Valle del Cauca	1,22904	(0,0238)	**
San Andres y Providencia	2,01099	(0,0387)	**
Amazonia/Orinoquia	0,59443	(0,0519)	**
Constant	-2,21816	(0,0223)	**
No. of observations	85150		
Pseudo R^2	0,3598		

Source of data: LSS, 2003

Table 6a. Self-reported Health Status of Minorities - *Familias en Acción*
(Number reported is the probability of being a minority)

	Yes	No	Signif*
Have health insurance	0,117	0,221	**
Younger than 6 years old:			
Diarrhea last 15 days	0,167	0,156	
Flu and fever last 15 days	0,155	0,159	
Ceased normal activities due to illness	0,175	0,143	**
Hospitalized during last 12 months	0,138	0,149	
Older than 7 years old:			
Illness episode during last 15 days	0,126	0,127	
Hospitalized during last 12 months	0,120	0,127	

Source: Familias en Acción

* Difference is significant at 95% confidence level

Table 6b. Other Measures of Health Status - *Familias en Acción*
(Number reported is the correlation between the health outcome and the probability of being a minority)

	Correlation
Weight at birth	-0,0346
Length at birth	0,0122
Child' s height at time of the survey	-0,0405 **
Mother' s height at time of the survey	-0,0595 **
Child' s weight at time of the survey	-0,0560 **
Mother' s weight at time of the survey	-0,0319
Height-for-age	-0,0468 **
Weight-for-age	-0,0569 **
Weight-for-height	-0,0362 **

Source: Familias en Acción

* Significant at 95% confidence level

Table 7a. Self-reported Health Status of Minorities - *Familias en Acción*
(Percentage of race/ethnic group)

	Minority	Rest	Pr(χ^2)
Have health insurance	68,9	86,7	0,000
Younger than 6 years old:			
Diarrhea last 15 days	16,1	14,6	0,240
Flu and fever last 15 days	41,7	46,6	0,006
Ceased normal activities due to illness	48,2	38,5	0,000
Hospitalized during last 12 months	6,2	6,7	0,660
Older than 7 years old:			
Illness episode during last 15 days	21,3	20,1	0,139
Hospitalized during last 12 months	6,43	6,07	0,453

Source: Familias en Acción

Table 7b. Other Measures of Health Status - *Familias en Acción*
(Means by race/ethnic group)

	Minority	Rest	Signif.*
Weight at birth (kgs)	3,4	3,6	**
Length at birth (cms)	50,4	49,7	
Child' s height at time of the survey (cms)	93,8	95,8	**
Mother' s height at time of the survey (cms)	152,0	154,0	**
Child' s weight at time of the survey (kgs)	14,2	14,9	**
Mother' s weight at time of the survey (kgs)	57,6	59,5	**
Height-for-age (sd. dev. from international standard)	-1,076	-0,890	**
Weight-for-age (sd. dev. from international standard)	-0,660	-0,487	**
Weight-for-height (sd. dev. from international standard)	0,030	0,140	**

Source: Familias en Acción

*Difference significant at 95%

Table 8a. Probit Model: Access to Health Care Insurance (using LSS, 2003)

Dep. Var.-> Access to Health Insurance	Mg. effect	Std. error	
Minority	-0,01470	(0,0095)	
Age	0,00364	(0,0002)	**
Less than 12 yrs old	0,08921	(0,0076)	**
Unemployed	-0,14705	(0,0148)	**
Employed with contract	0,29281	(0,0085)	**
Currently studying	0,07301	(0,0065)	**
Socioeconomic Sisben level	0,14592	(0,0027)	**
Gender	-0,03060	(0,0054)	**
Resides in a capital city	-0,05742	(0,0073)	**
Atlantic Region	-0,10181	(0,0093)	**
Oriental Region	-0,05423	(0,0099)	**
Central Region	-0,15854	(0,0100)	**
Pacific Region	-0,08735	(0,0108)	**
Antioquia	-0,07197	(0,0107)	**
Valle del Cauca	-0,18396	(0,0098)	**
San Andres y Providencia	0,10957	(0,0153)	**
Amazonia/Orinoquia	-0,03574	(0,0154)	**
No. of observations	83067		
Pseudo R^2	0,1363		

Table 8b: Probit Model Access to Health Care Insurance by ethnic group (LSS, 2003)

Dep. Var.-> Access to Health Insurance	Mg change	Std. error	
Indigenous	0,07589	(0,0155)	**
Afrodescendents	-0,04291	(0,0105)	**
Other minorities*	0,06676	(0,0875)	
Age	0,00242	(0,0008)	**
Age^2	0,00001	(0,0000)	
Less than 12 yrs old	0,07692	(0,0105)	**
Unemployed	-0,14400	(0,0149)	**
Employed with contract	0,29452	(0,0084)	**
Currently studying	0,07245	(0,0065)	**
Socioeconomic Sisben level	0,14601	(0,0027)	**
Gender	-0,03085	(0,0054)	**
Resides in a capital city	-0,05691	(0,0073)	**
Atlantic Region	-0,10242	(0,0093)	**
Oriental Region	-0,05361	(0,0100)	**
Central Region	-0,15871	(0,0100)	**
Pacific Region	-0,08982	(0,0109)	**
Antioquia	-0,07128	(0,0107)	**
Valle del Cauca	-0,17804	(0,0099)	**
San Andres y Providencia	0,07902	(0,0392)	*
Amazonia/Orinoquia	-0,03919	(0,0154)	**
No. of observations	83067		
Pseudo R^2	0,1372		

Table 8c: Fully Interacted Probit Model Access to Health Care Insurance

Dep. Var.-> Access to Health Insurance	Mg change	Std. error	Cumul. Pr(chi2)	
Minority dummy	-0,1594	(0,0628)	0,0095	
Age (for minorities)	0,0090	(0,0020)	0,002	**
Age (for non minorities)	0,0016	(0,0008)		
Age^2 (for minorities)	-0,0001	(0,0000)	0,0053	**
Age^2 (for non minorities)	0,0000	(0,0000)		
Less than 12 yrs old (for minorities)	0,1066	(0,0243)	0,0004	**
Less than 12 yrs old (for non minorities)	0,0729	(0,0113)		
Unemployed (for minorities)	-0,0571	(0,0437)	0,0001	
Unemployed (for non minorities)	-0,1566	(0,0157)		
Employed with contract (for minorities)	0,2995	(0,0212)	0,0001	**
Employed with contract (for non minorities)	0,2914	(0,0087)		
Currently studying (for minorities)	0,0996	(0,0152)	0,0002	**
Currently studying (for non minorities)	0,0673	(0,0070)		
Socioeconomic Sisben level (for minorities)	0,1494	(0,0076)	0,0003	**
Socioeconomic Sisben level (for non minorities)	0,1455	(0,0029)		
Gender (for minorities)	-0,0405	(0,0151)	0,0006	**
Gender (for non minorities)	-0,0300	(0,0058)		
Resides in a capital city (for minorities)	-0,0546	(0,0253)	0,0009	**
Resides in a capital city (for non minorities)	-0,0589	(0,0077)		
Total Cumul. Chi2	81,50			
No. of observations	83.067			
Pseudo R^2	0,1374			

Regional dummies not reported

Table 9a. Probit Model: Health Outcomes (using the LSS, 2003)

Dep. Var.->	Excellent-to-Poor Scale	Chronic Disease	Illness episode last 30 days	Hospitalization last 12 months
Minority	-0,0100	0,0046	-0,0110 **	-0,0134 **
	(0,0226)	(0,0065)	(0,0054)	(0,0041)
Access to health insurance	0,1136	0,0335 **	0,0111 **	0,0201 **
	(0,1179)	(0,0038)	(0,0038)	(0,0027)
Propensity Score (access to health insurance)	0,0184	-0,0411	-0,1683 **	-0,1903 **
	(0,0148)	(0,0321)	(0,0314)	(0,0221)
log (expenditures per capita)	-0,0721 **	0,0174 **	0,0162 **	0,0035
	(0,0187)	(0,0047)	(0,0047)	(0,0035)
Socioeconomic Sisben level	-0,1019 **	0,0095 *	0,0352 **	0,0265 **
	(0,0185)	(0,0050)	(0,0049)	(0,0035)
Average years of schooling	-0,0358 **	-0,0039 **	-0,0027 **	-0,0008 *
	(0,0021)	(0,0005)	(0,0005)	(0,0004)
Gender	-0,1868 **	-0,0328 **	-0,0271 **	-0,0273 **
	(0,0133)	(0,0035)	(0,0034)	(0,0026)
Age	0,0176 **	0,0023 **	-0,0014 **	-0,0009 **
	(0,0014)	(0,0003)	(0,0003)	(0,0002)
Age^2	0,00005 **	0,00003 **	0,00003 **	0,0000 **
	(0,0000)	(0,0000)	(0,0000)	(0,0000)
Employed with contract	-0,2250 **	-0,0209 **	0,0349 **	0,05441 **
	(0,0359)	(0,0081)	(0,0109)	(0,0098)
Number of durable goods in household	-0,0580 **	0,0002	-0,0025 **	0,0097 **
	(0,0034)	(0,0009)	(0,0009)	(0,0074)
Member of household addict/alcoholic	0,1247 **	0,0164 *	0,0371 **	-0,0013
	(0,0351)	(0,0096)	(0,0108)	(0,0006)
Place of birth different from place of residence	-0,0707 **	-0,0123 **	-0,0304 **	-0,0176 **
	(0,0148)	(0,0038)	(0,0039)	(0,0029)
A member did not eat during an entire day involuntarily	0,1672 **	0,0146 **	0,0239 **	0,0167 **
	(0,0222)	(0,0067)	(0,0064)	(0,0051)
Atlantic Region 1	0,0781 **	-0,0265 **	0,0349 **	-0,0062
	(0,0209)	(0,0053)	(0,0061)	(0,0039)
Oriental Region 2	0,0626 **	0,0281 **	0,0319 **	0,0066
	(0,0203)	(0,0059)	(0,0061)	(0,0041)
Central Region 3	-0,0040	0,0092	0,0070	-0,0094 **
	(0,0226)	(0,0065)	(0,0064)	(0,0040)
Pacific Region 4	0,3616 **	0,0296 **	0,0833 **	0,0027
	(0,0214)	(0,0068)	(0,0078)	(0,0045)
Antioquia 6	-0,1998 **	0,0369 **	0,0414 **	-0,0139 **
	(0,0243)	(0,0067)	(0,0074)	(0,0036)
Valle del Cauca 7	-0,0584 **	0,0226 **	0,0140 **	-0,0135 **
	(0,0256)	(0,0073)	(0,0072)	(0,0042)
San Andres y Providencia 8	-0,2204 **	0,0066	-0,0278 **	0,0393 **
	(0,0388)	(0,0114)	(0,0110)	(0,0118)
Amazonia/Orinoquia 9	0,0844 **	-0,0076	0,0479 **	0,0413 **
	(0,0347)	(0,0089)	(0,0118)	(0,0089)
Estimation	Ord. probit	Probit	Probit	Probit
No. of observations	82938	82938	82938	82938
Pseudo R^2 / R^2	0,1245	0,1297	0,0185	0,0278

The excellent to poor scale is 1 if individual reports his/her health status to be excellent, 2 if it is good, 3 if fair and 4 if poor.

Table 9b. Fully Interacted Probit Model: Health Outcomes (using the LSS, 2003)

Dep. Var.->	Illness episode last 30 days		Hospitalization last 12 months	
Minority	-3,6929	**	-1,4850	
	(0,8352)		(1,1018)	
Access to health insurance (minority)	0,0327		0,1430	**
	(0,0529)		(0,0686)	
Access to health insurance (non minority)	0,0465	**	0,1600	**
	(0,0216)		(0,0254)	
Propensity Score (access to health insurance) (minority)	0,4333		-1,2429	**
	(0,4468)		(0,5405)	
Propensity Score (access to health insurance) (non minority)	-1,0339	**	-1,6322	**
	(0,1732)		(0,1902)	
log (expenditures per capita) (minority)	0,4333	**	0,1065	
	(0,4468)		(0,0863)	
log (expenditures per capita) (non minority)	0,0395		0,0145	
	(0,0271)		(0,0307)	
Socioeconomic Sisben level (minority)	-0,1041		0,1560	*
	(0,0702)		(0,0839)	
Socioeconomic Sisben level (non minority)	0,2295	**	0,2377	**
	(0,0273)		(0,0304)	
Average years of schooling (minority)	0,0047		-0,0051	
	(0,0088)		(0,0109)	
Average years of schooling (non minority)	-0,0173	**	-0,0077	**
	(0,0030)		(0,0035)	
Gender (minority)	-0,1444	**	-0,1197	*
	(0,0496)		(0,0643)	
Gender (non minority)	-0,1469	**	-0,2403	**
	(0,0195)		(0,0228)	
Age (minority)	-0,0092	*	-0,0005	
	(0,0048)		(0,0055)	
Age (non minority)	-0,0036	**	-0,0040	*
	(0,0018)		(0,0021)	
Age^2 (minority)	0,0002	**	0,0001	*
	(0,0001)		(0,0001)	
Age^2 (non minority)	0,0001	**	0,0002	**
	(0,0000)		(0,0000)	
Employed with contract (minority)	-0,1228		0,2456	
	(0,1535)		(0,1780)	
Employed with contract (non minority)	0,1906	**	0,3711	**
	(0,0507)		(0,0543)	
Member of household addict/alcoholic (minority)	0,2567	*	0,2289	
	(0,1324)		(0,1439)	
Member of household addict/alcoholic (non minority)	0,1630	**	0,0464	
	(0,0508)		(0,0591)	
Number of durable goods in household (minority)	-0,0169		0,0082	
	(0,0146)		(0,0173)	
Number of durable goods in household (non minority)	-0,0119	**	-0,0118	**
	(0,0050)		(0,0053)	
A member did not eat during an entire day involuntarily (minority)	0,0660		0,0821	
	(0,0655)		(0,0871)	
A member did not eat during an entire day involuntarily (non minority)	0,1268	**	0,1364	**
	(0,0332)		(0,0394)	
Constant	-1,8281		-1,4505	
	(0,3326)		(0,3761)	
No. of observations	82.938		82.938	
Pseudo R^2 / R^2	0,0183		0,0267	

Table 10. Probit Model: Access to Health Care Insurance (*Familias en Acción)*

Dep. Var.-> Access to Health Insurance	Coefficient	Std. error	
Minority	-0,0603	(0,0676)	
Age	0,0282	(0,0030)	**
Age^2	-0,0002	(0,0000)	**
Less than 12 yrs old	0,0251	(0,0046)	**
Unemployed	0,2618	(0,0400)	
Receives severance payments	0,0976	(0,0788)	**
Currently studying	0,3477	(0,0912)	**
log(expenditures per capita)	0,2699	(0,0249)	
Unsatisfied Basic Needs	0,0137	(0,0157)	**
Education Attainment	-0,0799	(0,0115)	**
Gender	-0,0885	(0,0197)	**
Rural	-0,1948	(0,0210)	**
Oriental Region	1,1333	(0,0337)	**
Central Region	1,0335	(0,0386)	**
Pacific Region	-0,0463	(0,0722)	
Antioquia	0,6867	(0,0364)	**
Valle del Cauca	0,3442	(0,0442)	**
Amazonia/Orinoquia	1,1259	(0,0626)	**
Constant	0,1738	(0,1796)	
No. of observations	68483		
Pseudo R^2	0,1257		

Table 11. Probit Model: Health Outcomes (using *Familias en Accion*)

Dep. Var.->	Height-for-age	Weight-for-age	Weight-for-height
Minority	-0,0157	0,2817	0,2607
	(0,1567)	(0,2094)	(0,2346)
Access to health insurance	-0,1457	-0,1063	-0,0397
	(0,0672) *	(0,0677)	(0,0709)
Propensity Score (access to health insurance)	1,3112	0,7601	-0,7812
	(1,2006)	(1,3602)	(1,3615)
log (expenditures per capita)	0,2424	0,0379	-0,0623
	(0,1108) *	(0,1198)	(0,1229)
Unsatisfied Basic Needs	-0,0572	-0,0572	-0,0648
	(0,0388)	(0,0377)	(0,0372) *
Average years of schooling of parents	0,0142	0,0403	0,0299
	(0,0093)	(0,0099) **	(0,0097) **
Mother' s height / weight	0,0393	0,0217	0,0071
	(0,0060) **	(0,0037) **	(0,0032) *
Head of household receives severance payment	0,1028	0,1723	0,1040
	(0,0775)	(0,0789) *	(0,0862)
Number of durable goods in household	0,0622	0,0609	0,0429
	(0,0138) **	(0,0142) **	(0,0155) **
Child went to medical control	0,0554	0,0180	0,0151
	(0,0494)	(0,0544)	(0,0537)
Rural dummy	0,1555	0,1525	0,0207
	(0,0745) *	(0,0913) *	(0,0981)
Oriental Region 2	-0,1843	-0,0768	0,3255
	(0,3320)	(0,3827)	(0,3973)
Central Region 3	-0,1530	-0,1934	0,1314
	(0,2971)	(0,3551)	(0,3624)
Pacific Region 4	0,0859	-0,2756	-0,2012
	(0,1732)	(0,2356)	(0,2578)
Antioquia 6	0,0129	0,0478	0,2915
	(0,2402)	(0,2822)	(0,2972)
Valle del Cauca 7	0,2653	0,0914	0,1099
	(0,1799)	(0,2124)	(0,2111)
Amazonia/Orinoquia 9	-0,0741	0,0058	0,4092
	(0,3479)	(0,4020)	(0,4024)
Constant	-11,1112	-3,0483	2,39625
	(1,8399)	(1,6512) **	(1,8488)
Estimation	OLS	OLS	OLS
No. of observations	5406	5406	4911
Pseudo R^2 / R^2	0,076	0,0771	0,0173

Figure 1

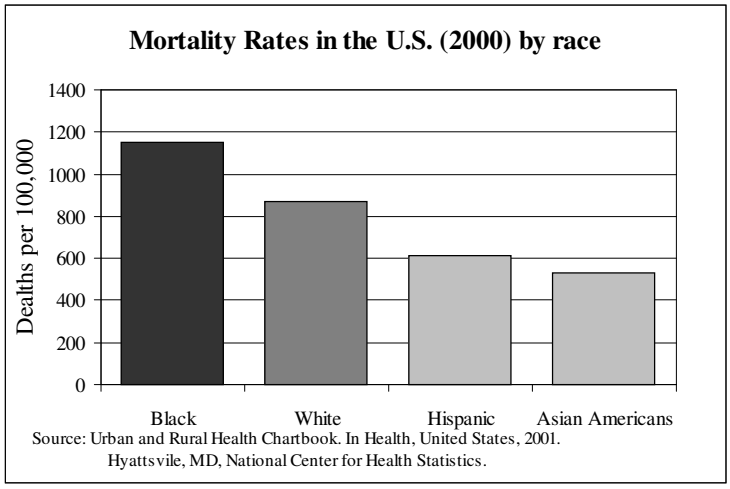


Figure 2

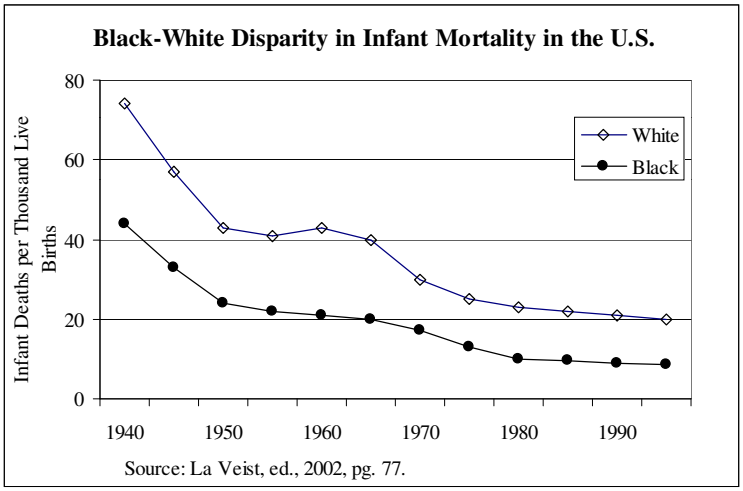


Figure 3

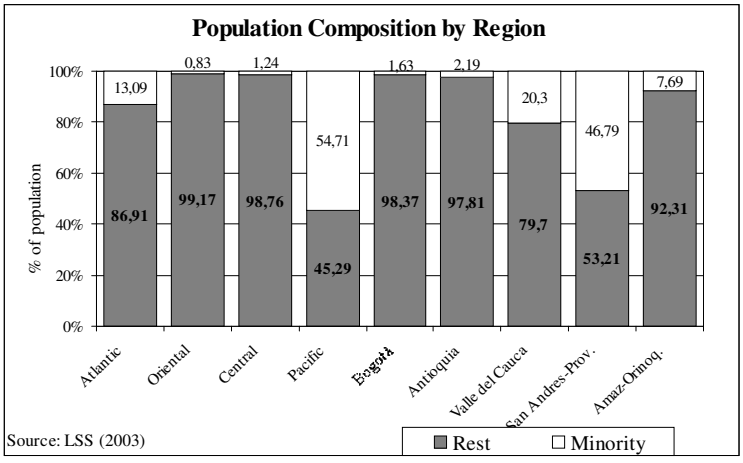


Figure 4

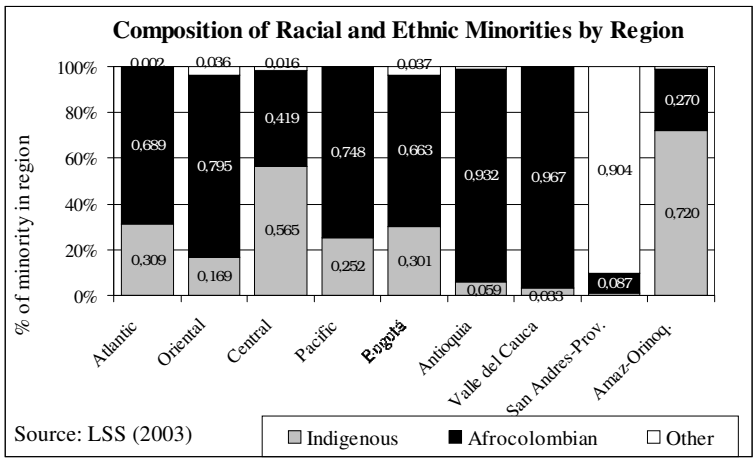


Figure 5

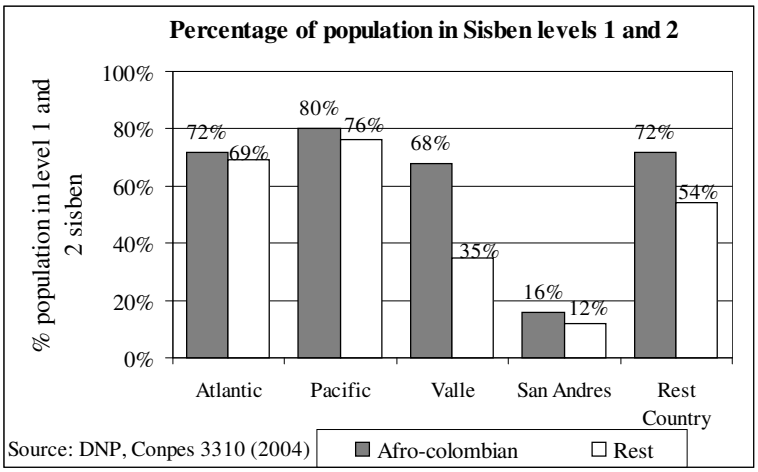


Figure 6

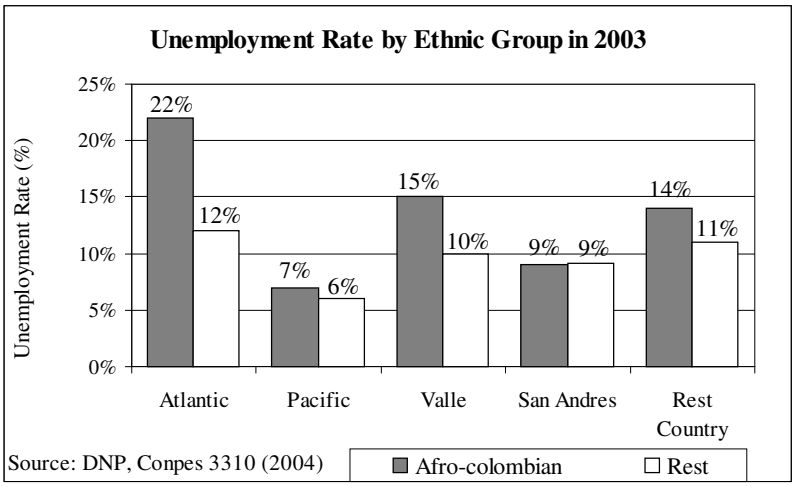


Figure 7

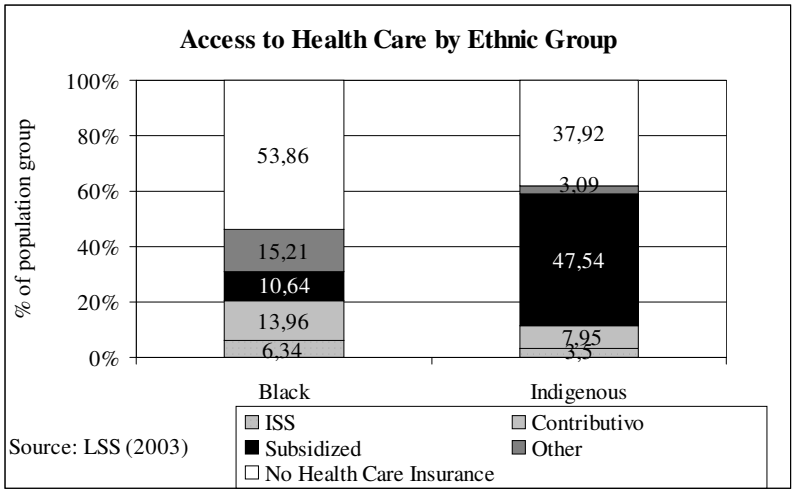


Figure 8

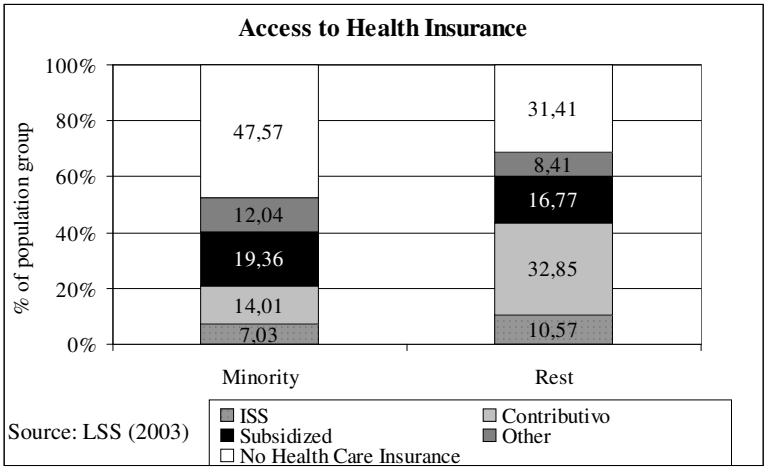


Figure 9

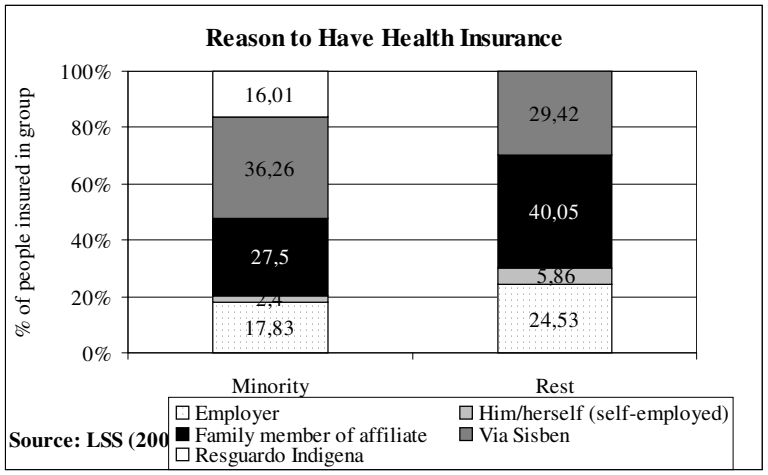
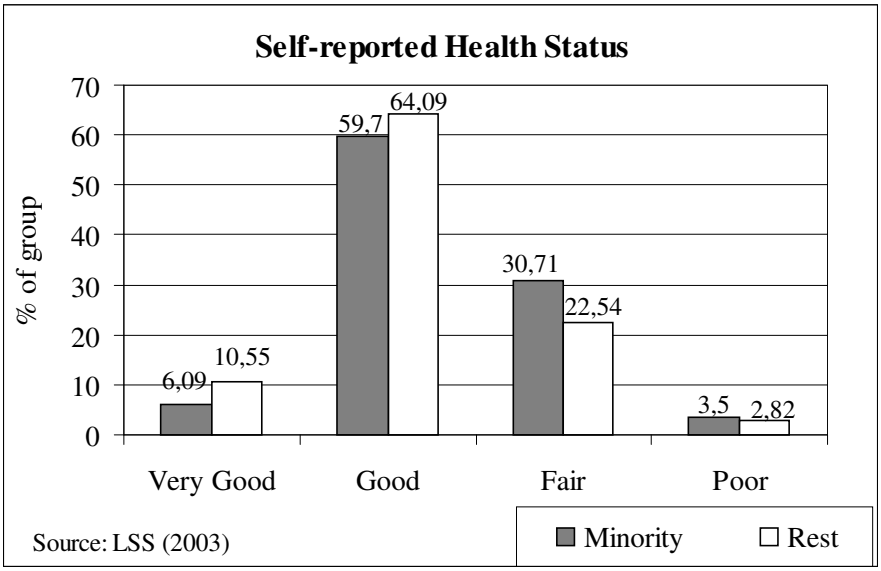


Figure 10


Self-reported Health Status
% of group
70
60
50
40
30
20
10
0
6,09
10,55
59,7
64,09
30,71
22,54
3,5
2,82
Very Good
Good
Fair
Poor
Minority
Rest
Source: LSS (2003)